

# A Phase I Program to Improve Low Temperature Performance of Lithium-Ion Batteries, Phase I

Completed Technology Project (2006 - 2006)

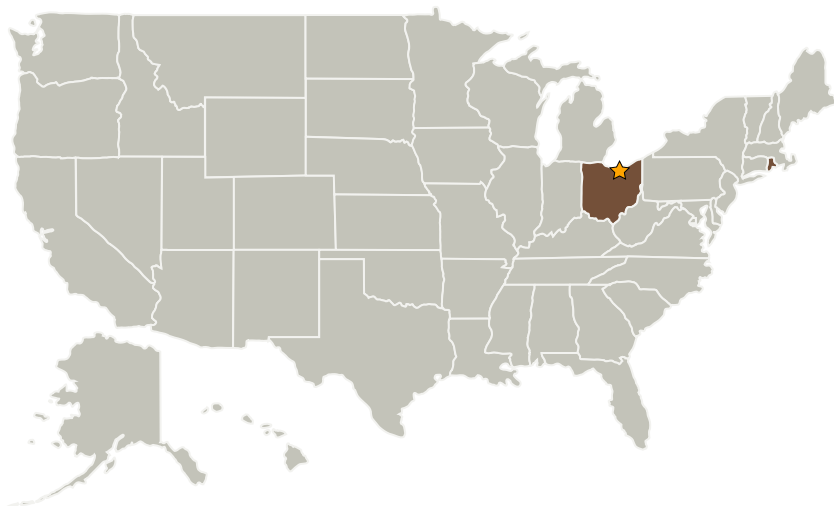


## Project Introduction

Lithium-ion (Li-ion) batteries are attractive candidates for use as power sources in aerospace applications because they have high specific energy (up to 200 Wh/kg) and energy density (~ 500 Wh/L) and long cycle life (1,000 to 30,000 cycles currently depending on the depth of cycling). However, at temperatures below about -10

°C, their charge/discharge performance is severely degraded which hinders their use in deep space and planetary missions. This decrease in performance may be due to the precipitation of ethylene carbonate (EC) at low temperatures, which may prevent the migration of Li<sup>+</sup> ions between the electrodes during charge and discharge. We propose to determine the cause of the EC precipitation. Appropriate electrolyte systems will be designed to prevent phase separation of the electrolyte at low temperatures during charge and discharge.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Glenn Research Center (GRC)

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Yardney Technical Products, Inc.	Supporting Organization	Industry	East Greenwich, Rhode Island

### Primary U.S. Work Locations

Ohio	Rhode Island
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## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

Carlos Torrez

## Technology Areas

### Primary:

- TX03 Aerospace Power and Energy Storage
  - └ TX03.2 Energy Storage
    - └ TX03.2.1 Electrochemical: Batteries